

THE IMPACT OF PEAK OIL ON PUBLIC PASSENGER TRANSPORT POLICY

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PEAK OIL

The time of “Peak Oil” will have been reached when global production peaks. If demand for oil-based products continues to increase, as appears inevitable, the amount of oil the world produces will no longer be able to keep up with the rising demand for it. We are close to that point now, if indeed we have not already passed it. Figure 1 shows a current estimate of the global production profile of oil and gas.

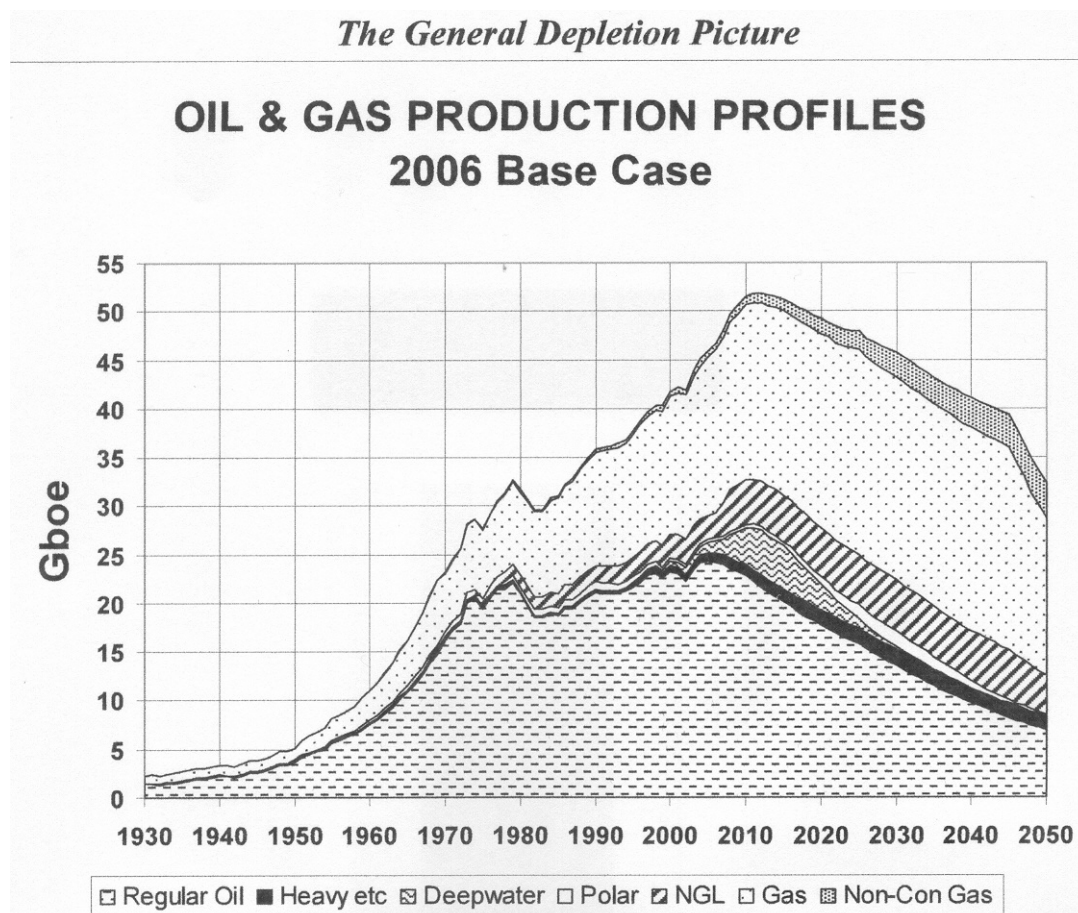


Figure 1: 2006 Estimate of Global Production Profile of Oil & Gas

Source: ASPO Newsletter April 2007, issued by ASPO-Ireland.

A summary of Peak Oil and Australia's position is available in a paper by Bruce Robinson and Sherry Mayo of ASPO-Australia (ASPO is the Association for the Study of Peak Oil and Gas) to an Energy Security Conference in Sydney in October 2006 [Robinson & Mayo (2006a)].

The key point – for this paper – is that, while there is some dispute about when the peak in global oil production will occur (estimates vary from the recent past to three decades hence), there would be few (some, but few) who would assert that in fifty years time (say) oil will not be scarcer and more expensive than today. Opinions differ about the timing of the peak, with more informed estimates identifying 2010-2012 for its occurrence than other times. There will of course still be a lot of oil available in the future – the world is in no imminent danger of running out of oil – but it will no longer be cheap oil. Hence in future our transport will have had to reduce its oil dependency if transport costs are not to be dominated by the higher price of fuel.

Dr Ali Samsan Bakhtiari, a former senior executive with the National Iranian Oil Company, describes the failure of the growth in global oil supply to keep up with the growth in global oil demand in terms of a series of transitions. These transitions will have to be faced by developed and developing nations alike, with the main differentiating factor between them being their ability to produce crude oil for export. Of the 36 countries in the world listed as major oil producers in Shah (2005), all but six were estimated to have passed their peak of production by 2005. The six were Saudi Arabia (2008), Iraq (2017), Abu Dhabi (2012), Kuwait (2015), Nigeria (2006) and Kazakhstan (2033). The future geopolitical implications of the world's oil supplies being largely in countries around the Persian Gulf and in the Caucasus are left to the reader to imagine.

Dr Bakhtiari asserts that the first, relatively benign, transition began in 2006, with price rises while there was still plenty of oil to be had. In later transitions there will be a physical decline in the quantity of oil available, with the world's ability to supply oil declining at an ever-growing rate. He asserts that by 2020 the world will only be able to produce about 55 million barrels a day of conventional oil, compared to 80-85 million today and a forecast of about 118 MBpd needed by 2030. Dr Bakhtiari came to Australia and gave evidence to a parliamentary Senate Inquiry into oil futures in July 2006 [Hansard (2006)].

What alternatives are there? With a fifty-year time horizon, it is not possible to rule out an unforeseen technical breakthrough, (after all, a similar exercise conducted in 1907 would probably have failed to predict the great war, the rise of automobility, and of aviation - although with hindsight the early signs of each were there) so failing such an unforeseeable event the main candidates are already identifiable. In the Interim and Final Reports of the Australian Senate Inquiry into Australia's Oil Future and Alternative Transport Fuels (Senate Rural and Regional Affairs Committee, 2006,2007), the main supply side options to ease the economic disruption of restricted fuel supplies and high prices are stated to be:

- finding more conventional oil supplies within Australia or in Australian territorial waters;
- sourcing a proportion of fuel requirements from biofuels such as ethanol or biodiesel;
- use of non-conventional petroleum, producing transport fuels by liquefying coal or natural gas, or producing it from oil shales, and
- fuel shifting, for instance using LPG, natural gas or hydrogen as a transport fuel.

These are the options as seen in Australia – other countries may differ.

The way in which the future unfolds will determine very much the approach to oil taken. The (then) Chartered Institute of Transport considered this issue in a National Symposium “Beyond Oil” in 1998. As the outcomes statement observed (CIT, 1998):

Should self interest predominate, we could become locked in conflict, unable to adapt and with the likelihood that we will dissipate unproductively the scarce high quality petroleum fuels so essential to a safe transformation to a world "beyond oil".

It is not only the means to produce transport fuels but also the means to store them, to distribute them and to use them that are required. Transport ideally needs a fuel which is portable and energy-dense, which is what makes liquid oil-based fuels so suitable and why the downstream oil refining, storage, distribution and utilisation technologies have developed along with the production (exploration and extraction) systems over the last hundred years or so. However it is likely that significant changes to at least some of these subsystems will be needed in the near future.

The length of time for these necessary subsystems to develop and mature to support alternative fuels should not be under-estimated. The World Business Council for Sustainable Development (2003) estimated that it would be at least 2050 before vehicles to utilise hydrogen-based technology, for instance, could be commercially available. (The WBCSD, representing “the Big End of Town” and focusing on 2030, did not subscribe to the peak oil theory and advocated further development of the Internal Combustion Engine as the most cost-effective way forward).

It looks as if supplies will meet that demand [a projected 20% increase in oil consumption by 2030]. If there is an obstacle ... it will be the politics and policies of oil-producing countries and swings in global economic growth.

I disagree with this conclusion, needless to say. In my view supplies will not meet demand, as documented in the references. Global production of oil peaked in December 2005, although it is possible that it may still rise slightly higher before it begins its inevitable decline. In general new facilities coming on-stream will not offset the decline in existing facilities, particularly the “giant” fields like Cantarell in Mexico and Burgan in Kuwait. The future of the biggest of them all, Ghawar in Saudi Arabia, is shrouded in secrecy.

The scale of the adjustments to our arrangements that this will eventually bring is vast. There is no technological “magic bullet” waiting in the wings to protect us from this.

IMPACTS ON TRANSPORT

- Transport is very dependent for its energy on oil. The use of non-oil-based fuels by transport operators in Australia is negligible. Australia is a very large country with a few major conurbations and transport is dominated both in cities and regional areas by the internal combustion engine. Rail is largely restricted to one

or two niche markets like the movement of bulk mineral exports, intercity containerised freight and (in Sydney) CBD commuters.

- The modes most dependent on oil are aviation and road transport. This paper does not address aviation issues. In the period 2001-2021 a 2.4% annual rise in transport energy is foreseen, with the largest absolute rise (about 44% over the period) being in Australian road transport (Department of Prime Minister and Cabinet, 2004) - much of which is accounted for by rising road freight rather than passenger transport (Department of Transport and Regional Services, 2004). This is not compatible with a scenario in which oil-based fuel availability will decline - indeed Dr Bakhtiari, who tends to be found at the pessimistic end of the spectrum of forecasts, asserts that by 2021 the world will only be producing about two thirds of today's conventional oil. (Hansard 2006).

Clearly this will have an impact way beyond transport, with effects felt in all walks of life including the agricultural, defence, health, housing, mining, pharmaceutical and tourism sectors of the economy. However because of its heavy dependence on oil transport is likely to be one of the first sectors to be affected.

The transport system is heavily reliant on petroleum-based fuels, which meet more than 97% of Australia's total transport needs. (Department of Prime Minister and Cabinet, 2004),

We can eventually expect to see a prioritization of the uses of oil, and it is highly likely that public passenger transport will be considered a higher priority than many independent car or truck trips, while the highest priority of all is likely to be given to the production and transport of food.

Greater use of electrified systems (hence railways and tramways) is also likely to feature, with the electricity not produced by oil-fired power stations. The main contenders for the production of stationary energy in Australia are seen by Government as coal (with cleaner technology) and nuclear power, though wind, solar, geothermal and other renewable forms of energy also have their advocates. This paper will only note that, in Australia as elsewhere, there is continuing public controversy and debate about this issue, though at present more related to climate change concerns than peak oil concerns.

IMPORTANCE OF PUBLIC PASSENGER TRANSPORT

The Senate Inquiry also reviewed demand-side options, which it considered to fall into two categories:

- Increasing the fuel efficiency of vehicles
- Reducing the demand for fossil-fuelled transport

In the latter category were options such as

- More use of rail for long distance freight
- Greater use of public transport, walking and cycling for urban person movement
- Reform of tax concessions for car use

It should be noted that ASPO-Australia (ASPO is an international movement) considers the development of alternatives to oil as a relatively low priority. They argue that first, the community should become engaged in informed debate about the options; second, we should start to be frugal in our consumption of energy; third, we should ensure that any energy we

unavoidably consume be used as efficiently as possible; and only then should we look to alternatives to oil. (NB the author is the co-ordinator of the Sydney activities of ASPO-Australia).

A common feature of strategies to manage the transition to a world “beyond oil” – where they exist at all - is the importance placed on public transport (and walking, and cycling). The change of status of public passenger transport is likely to have policy implications, as below.

Public passenger transport will be seen as an essential component to maintain urban mobility (along with adequate pedestrian and bicycle networks for shorter trips), rather than a marginal sector catering for a minority of trips. It is probable that the present situation in developed countries, whereby (in general) railways are centrally planned whereas bus networks are not, will not be considered good enough and greater integration of the planning of road and rail services will be called for. Low-energy transport will make its appearance where it does not already exist. Good passenger transport will be looked upon as a lifeboat is to a ship, not needed much of the time but when it is needed it is needed very badly. It allows the survival of movement for people in cities (today over half the world population lives in cities) and will not be a minority mode while subsidies are directed towards independent movement in a private motor car, the transport mode of choice of most people today.

WHAT TO EXPECT

Environmental improvements (ie smaller vehicles that use less energy) will be sought in the independent movement sector, while social (greater use of scheduled public transport services) and economic (lower cost for tailored services, eg informal transit and freight logistics) improvements will be sought in the movement sector where transport services are provided by third parties.

“Transport” can take place on land, in the air or by water. The most oil-dependent mode is aviation, especially passenger aviation, for there is no technological alternative in sight to the heavier-than-air aircraft, powered by fossil fuel. Many observers (eg May, 2005) consider that, on ecological grounds, demand to travel by air needs to be reduced – and peak oil adds reinforcement to that view. This is obviously of concern to an island nation a long way from anywhere else.

Modelling of a permanent doubling in the world oil price, commissioned by the Queensland Government, projected air transport activities to be 27% lower in 2016-17 than it would otherwise have been without increases in fuel price. (Senate Rural and Regional Affairs Committee, 2006).

NB the fuel price nationally is also affected by movement in the exchange rate, not just in the price of crude oil which is traditionally measured in US dollars.

Road transport is also heavily dependent on oil, although not to the same extent as aviation. It is likely that the future will see more road vehicles, although possibly lighter and more fuel-efficient than those that we are used to. For both passengers and freight, it is possible (as discussed by Bowers et al, 2006) that dividing transport by function, into independent means and services provided by third parties, could be more productive than the more traditional divisions into road and rail, or passengers and freight, or even cars and public transport (which overlooks the potential of walking and cycling to meet short-distance needs in urban areas). Figure 2 shows this concept. For heavy vehicles, operations that permit refuelling at a

central depot will be at an advantage while an alternative fuel distribution system (or systems) is being established.

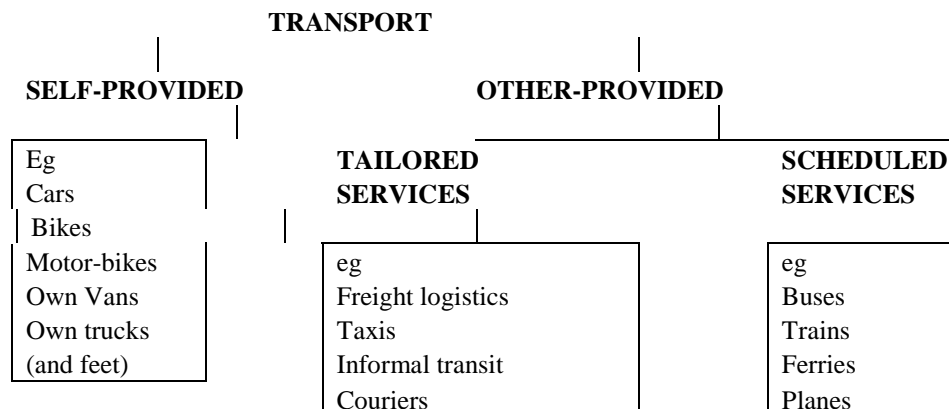


Figure 2: Possible new conceptualisation of transport

The other main mode for land transport is rail. A railway locomotive is basically a power plant rolling on rails. Therefore this mode, because of the greater size of the traction unit, is in theory less vulnerable to oil depletion than road transport. It can adapt to whatever fuel option is most economical at the time. In the past railways have used the energy contained in wood, coal, oil and gas.

The same comment applies, and probably more so, to water transport, where the floating power plant, attached to the floating payload, tends to be even larger than for railway locomotives. It is likely that marine diesel will not be so easy to come by in future, but ships do not necessarily have to be powered by marine diesel.

ASPO-Australia (2006) presented the following options to the Australian Senate Inquiry. If action on all fronts were taken simultaneously, the end result could be a halving of Australia's fuel consumption without needing to rely on technology to "come up with something" to allow us to continue our energy-profligate way of life.

Community engagement: empowering people to understand the Peak Oil concept and to help decide the best options for us all before we face a future oil shortage.

Individualised marketing: a proven, rapid and low-cost strategy, offering individual households the information needed to consider options of reducing automobile travel. A 13% reduction in car-km has been achieved in large programs in Australia. It can also be used for minimisation of demand for water and electricity and perhaps can be adapted to alert people to Peak Oil probabilities and risks.

Fuel tax escalator: Increasing fuel taxes smoothly and incrementally to UK levels (following Margaret Thatcher's 1988 example) would provide a clear signal that we must value fuel much more than we do now. "Unthinkable" measures such as this are essential given the magnitude of the near-term risks posed by Peak Oil. Fuel tax increases could provide funds

for schools, hospitals, and for sustainable transport infrastructure. The impacts could, for instance, be ameliorated by abolishing fixed vehicle-ownership charges (licence and third party charges) and by lowering income taxes.

Smartcard flexible tradeable fuel allocation and pricing mechanism: providing a basic safety-net ration for modest usage, and extra fuel at an increasing taxation rate for those who want to use more than average. Unused allocations can be traded to reward those with ingenious ways of reducing fuel usage.

Robinson & Mayo elaborated on individualised marketing and tradable gasoline rights in a recent paper to a conference in Japan (Robinson & Mayo 2006b). Sydney is the only major Australian city so far not to have undertaken large-scale individualized marketing, even though the share of passenger kilometers attributable to public transport is already, at 16%, twice as high as the next best, Melbourne, and up to four times as high as the smaller cities of Brisbane, Adelaide, Perth and Canberra, as recorded by Newman & Kenworthy (1999)

If we wait until it is evident that the peak of global oil production has arrived, it will be too late to mitigate the effects, as Hirsch et al (2005) reported to the US Department of Energy. .

CONCLUSIONS

Peak Oil will increase the price and reduce the availability of oil for transport.

Opinions differ about when this would occur, with 2010-2012 the most frequently predicted date.

When this occurs, the disruption to our ways of life, whether first- or third-world, will be enormous.

There are no technological developments currently “in the pipeline” to avoid this.

Aviation is the most vulnerable mode, followed by road transport. Rail transport and sea transport are the least vulnerable.

There are likely to be more road vehicles in future than today, although these will probably be lighter and more fuel-efficient than we are used to.

Public transport will inevitably be given higher priority than much independent transport as a user of oil.

Embarking now in a program of community engagement, tradeable fuel allocations, a fuel tax escalator and individualised marketing would reduce the risk faced – at least in Australia.

Peak oil will have implications for the policy attention given to passenger transport.

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